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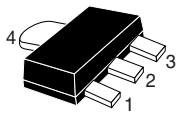
# 2STF2360

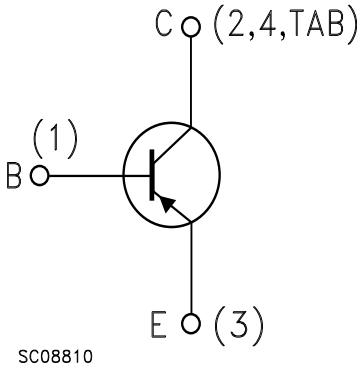
## Low voltage fast-switching PNP power transistors

**Datasheet - production data**




**SOT-89**

**Figure 1. Internal schematic diagram**




## Applications

- Emergency lighting
- LED
- Voltage regulation
- Relay drive

## Description

The device is PNP transistor manufactured using new “PB-HDC” (power bipolar high density current) technology. The resulting transistor shows exceptional high gain performances coupled with very low saturation voltage.

## Features

- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast-switching speed

**Table 1. Device summary**

| Order code | Marking | Package | Packaging |
|---|---|---|---|
| 2STF2360 | 2360 | SOT-89 | Tape and reel |



This is information on a product in full production. www.st.com

# Contents

# 1 Absolute maximum ratings

**Table 2. Absolute maximum ratings**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CBO}$ | Collector-base voltage ($I_E$ = 0) | -60 | V |
| $V_{CEO}$ | Collector-emitter voltage ($I_B$ = 0) | -60 | V |
| $V_{EBO}$ | Emitter-base voltage ($I_C$ = 0) | -6 | V |
| $I_C$ | Collector current | -3 | A |
| $I_{CM}$ | Collector peak current ($t_P$ < 5 ms) | -5 | A |
| $I_B$ | Base current | -0.2 | A |
| $I_{BM}$ | Base peak current ($t_P$ < 5 ms) | -0.4 | A |
| $P_{TOT}$ | Total dissipation at $T_{amb}$ = 25 °C | 1.4 | W |
| Tstg | Storage temperature | -65 to 150 | °C |
| TJ | Max. operating junction temperature | 150 | °C |

**Table 3. Thermal data**

| Symbol | Parameter | SOT-89 | Unit |
|---|---|---|---|
| $R_{thJA}$ (1) | Thermal resistance junction-ambient Max | 89 | °C/W |

1. Device mounted on a PCB area of 1 $cm^2$

# 2 Electrical characteristics

$T_{CASE}$ = 25°C; unless otherwise specified.

**Table 4. Electrical characteristics**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CBO}$ | Collector cut-off current ($I_E$ = 0) | $V_{CB}$ = - 60 V | | | -100 | nA |
| $I_{EBO}$ | Emitter cut-off current ($I_C$ = 0) | $V_{EB}$ = - 6 V | | | -100 | nA |
| $V_{BE(on)}$ | Base-emitter on voltage | $V_{CE}$ = - 2 V $I_C$ = - 100 mA | -630 | -650 | -730 | mV |
| $V_{CE(sat)}$ (1) | Collector-emitter saturation voltage | $I_C$ = - 2 A $I_B$ = - 100 mA<br>$I_C$ = - 3 A $I_B$ = - 150 mA | | -200<br>-300 | -320<br>-500 | mV<br>mV |
| $V_{BE(sat)}$ (1) | Base-emitter saturation voltage | $I_C$ = - 2 A $I_B$ = -100 mA | | -0.9 | -1.2 | V |
| $h_{FE}$ (1) | DC current gain | $I_C$ = - 100 mA $V_{CE}$ = - 2 V<br>$I_C$ = - 1 A $V_{CE}$ = - 2 V | 200<br>160 | | <br>400 | |
| | Resistive load | | | | | |
| td | Delay time | $I_C$ = - 3 A $V_{CC}$ = - 10 V | | 10 | 15 | ns |
| tr | Rise time | $I_{B(on)}$ = - $I_{B(off)}$ = - 300 mA | | 75 | 100 | ns |
| ts | Storage time | $V_{BE(off)}$ = 5 V | | 250 | 350 | ns |
| tf | Fall time | | | 35 | 50 | ns |
| $f_T$ | Transition frequency | $I_C$ = - 0.1 A $V_{CE}$ = - 10 V | | 130 | | MHz |

1. Pulse test: pulse duration ≤ 300 µs, duty cycle ≤ 2 %

## 2.1 Typical characteristics (curves)

**Figure 2. DC current gain ($V_{CE}$ = - 2 V)**

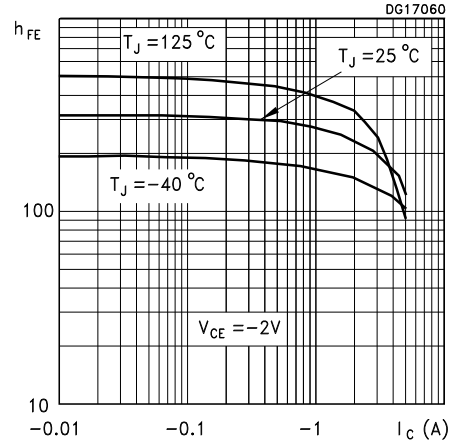



**Figure 3. DC current gain ($V_{CE}$ = - 5 V)**

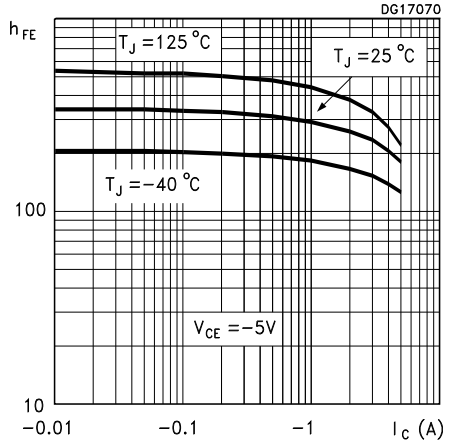



**Figure 4. Collector emitter saturation voltage**

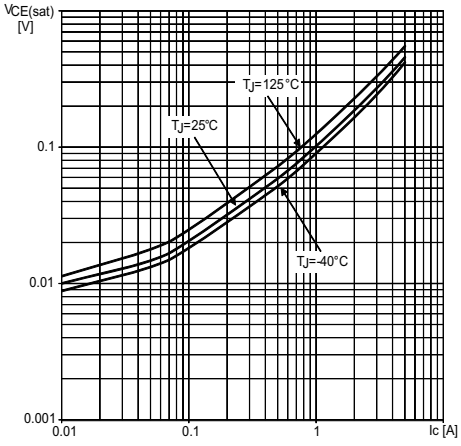



**Figure 5. Base emitter saturation voltage**

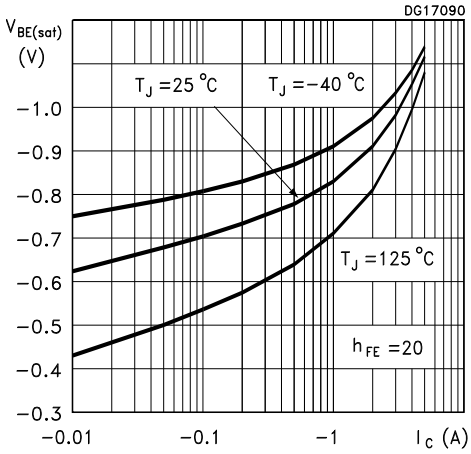



**Figure 6. Resistive load switching on**

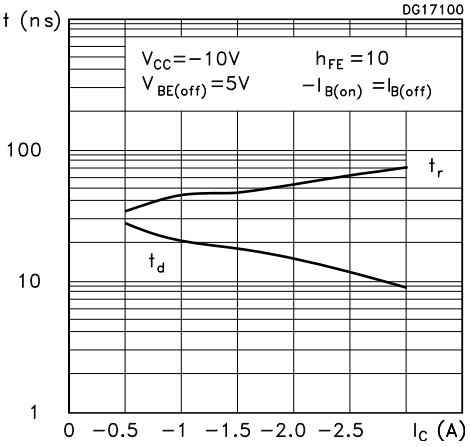



**Figure 7. Resistive load switching off**

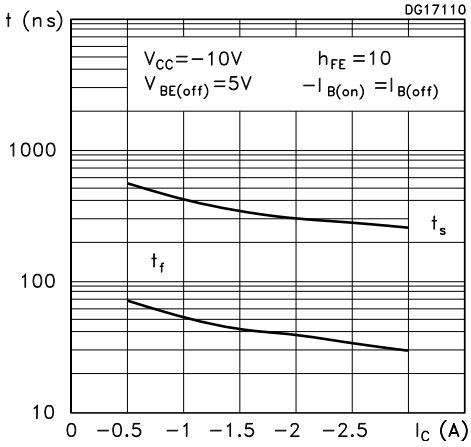
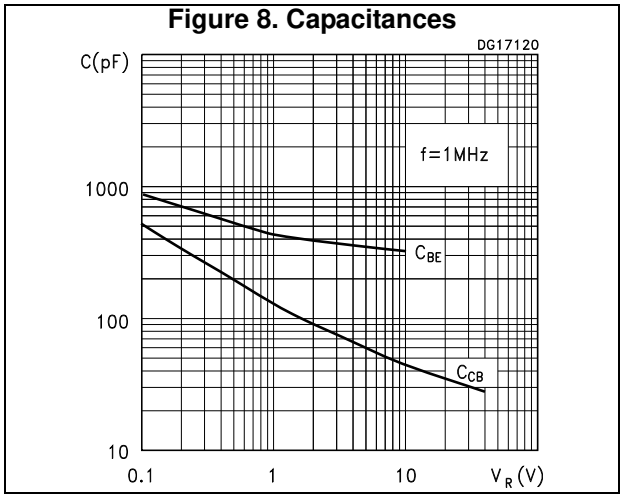
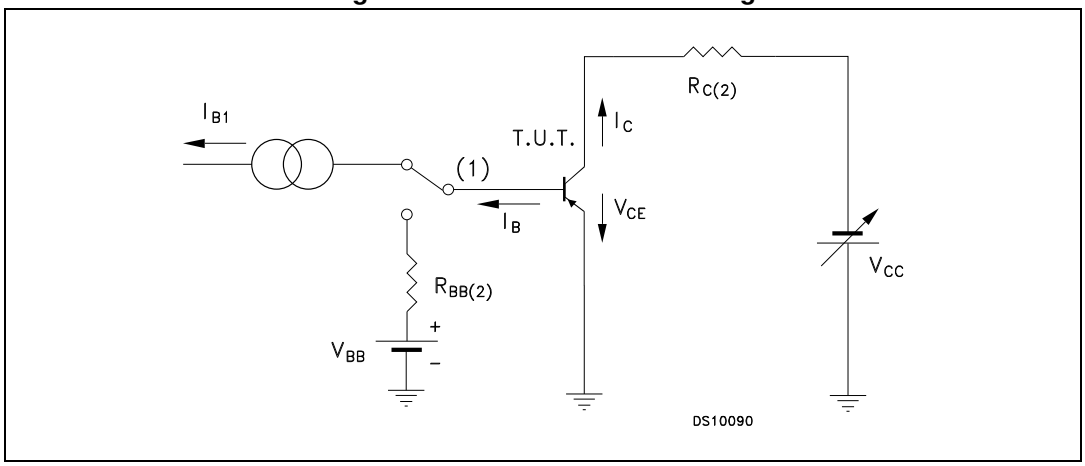


**Figure 8. Capacitances**




## 2.2 Test circuits

**Figure 9. Resistive load switching**




1. Fast electronic switch
2. Non-inductive resistor

# 3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

## 3.1 SOT-89

**Figure 10. SOT-89 package outline**

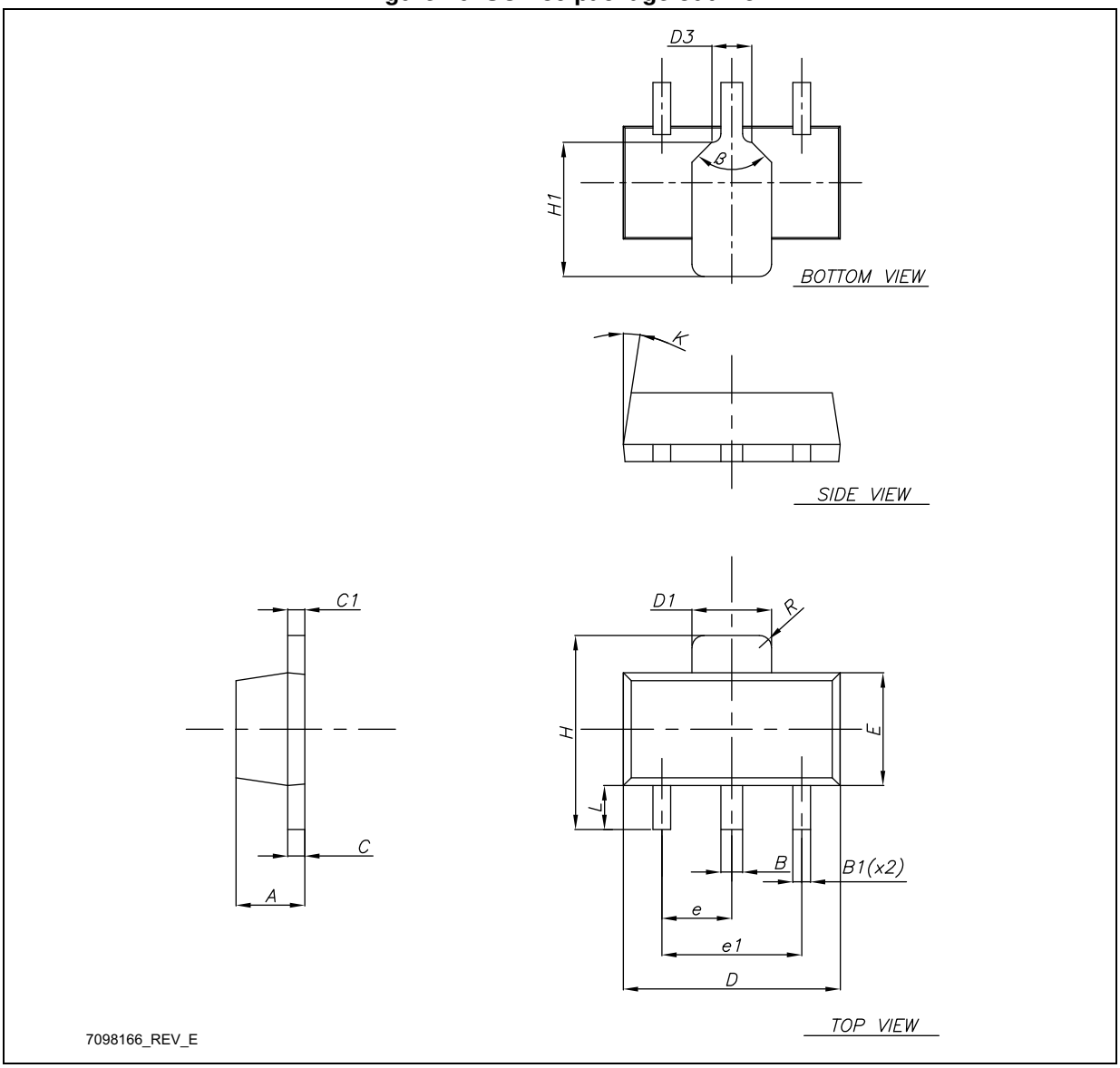
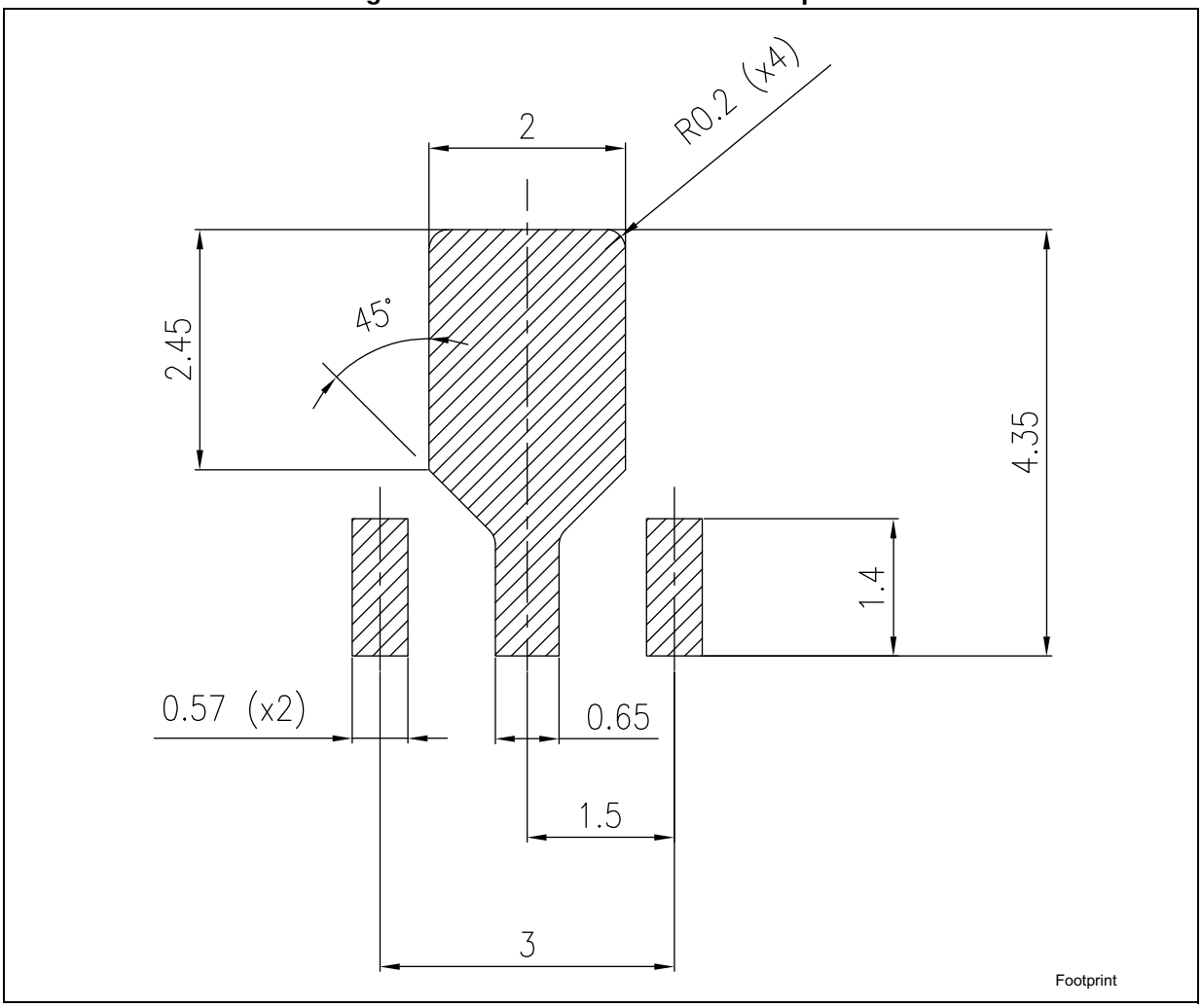


Table 5. SOT-89 mechanical data

| Dim. | mm | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| A | 1.40 | | 1.60 |
| B | 0.44 | | 0.56 |
| B1 | 0.36 | | 0.48 |
| C | 0.35 | | 0.44 |
| C1 | 0.35 | | 0.44 |
| D | 4.40 | | 4.60 |
| D1 | 1.62 | | 1.83 |
| D3 | | 0.90 | |
| E | 2.29 | | 2.60 |
| e | 1.42 | | 1.57 |
| e1 | 2.92 | | 3.07 |
| H | 3.94 | | 4.25 |
| H1 | 2.70 | | 3.10 |
| K | 1° | | 8° |
| L | 0.89 | | 1.20 |
| R | | 0.25 | |
| b | | 90° | |

**Figure 11. SOT-89 recommended footprint**



# 4 Revision history

Table 6. Document revision history

| Date | Revision | Changes |
|---|---|---|
| 13-Sep-2006 | 1 | Initial release |
| 02-Mar-2007 | 2 | New graphics have been added |
| 23-Jan-2009 | 3 | Updated mechanical data |
| 09-Oct-2009 | 4 | Added 2STD2360T4 in TO-252 (DPAK) package |
| 14-Oct-2009 | 5 | Modified *Table 1 on page 1*. |
| 05-Dec-2014 | 6 | Removed SOT-223 and TO-250 (DPAK) packages.<br>Update description in cover page, *Table 1: Device summary*, *Section 1: Absolute maximum ratings*, *Table 4: Electrical characteristics*, *Section 2.1: Typical characteristics (curves)* and *Section 3: Package mechanical data*.<br>Minor text changes. |

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